

WHAT IS CLAIMED IS:

1. A method for protecting a label switched path (LSP) between two label switch routers (LSRs) in a ring network that utilizes a label switching protocol to communicate packets of information, wherein each LSR in said ring network is connected to a right side neighbor LSR and a left side neighbor LSR by respective links, said method comprising:

identifying a working LSP between first and second neighbor LSRs in said ring network, said working LSP having a first direction around said ring network;

establishing a protection LSP between said first and second neighbor LSRs for communicating packets between said first and second neighbor LSRs in the event of a failure of the link that is utilized by said working LSP, said protection LSP utilizing said ring network and having an opposite direction to said first direction; and

switching packets from said working LSP to said protection LSP in response to a failure of said link that is utilized by said working LSP.

2. The method of claim 1 further including switching packets from said protection LSP back to said working LSP after said packets have traversed said protection LSP.

3. The method of claim 1 further including switching packets from said protection LSP to a next hop working LSP after said packets have traversed said protection LSP.

4. The method of claim 1 wherein switching packets from said working LSP to said protection LSP includes switching the label of a packet from a working label to a protection label.

5. The method of claim 1 wherein switching packets from said working LSP to said protection LSP includes adjusting time-to-live (TTL) values of said packets to account for the number of LSRs that are along said protection LSP.

5 6. The method of claim 5 wherein adjusting said TTL values includes adding N to said TTL values, where N is a function of the number of LSRs along said protection LSP.

7. The method of claim 5 further including:

10 switching packets back to said working LSP from said protection LSP after said packets have traversed said protection LSP; and

using TTL values from packets that have traversed said protection LSP to generate TTL values for said packets that are switched back to said working LSP from said protection LSP.

15 8. The method of claim 5 further including:

switching packets from said protection LSP to a next hop working LSP after said packets have traversed said protection LSP; and

20 using TTL values from packets that have traversed said protection LSP to generate TTL values for said packets that are switched to said next hop working LSP from said protection LSP.

9. The method of claim 1 further including establishing at least one protection LSP for each link between neighbor LSRs on said ring network.

25 10. The method of claim 1 wherein said LSRs utilize multiprotocol label switching (MPLS) to communicate packets around said ring network.

11. A system for protecting a label switched path (LSP) between two label switch routers (LSRs) in a ring network that utilizes a label switching protocol to communicate packets of information between LSRs in said ring network, wherein each LSR in said ring network is connected to a right side neighbor LSR and a
5 left side neighbor LSR by respective links, each LSR in said ring network comprising:

a label switching module, associated with an LSR, for identifying a working LSP between said LSR and a neighbor LSR, said working LSP having a first direction around said ring network; and

10 a failure protection module for:

establishing a protection LSP between said LSR and said neighbor LSR that enables packets to be communicated between said LSR and said neighbor LSR in the event of a failure of the link that is utilized by said working LSP, said protection LSP utilizing
15 said ring network and having an opposite direction to said first direction; and

switching packets from said working LSP to said protection LSP in response to a failure of said link that is utilized by said working LSP.

12. The system of claim 11 wherein said failure protection module includes logic for switching packets from said protection LSP back to said working LSP after said packets have traversed said protection LSP.

25 13. The system of claim 11 wherein said failure protection module includes logic for switching packets from said protection LSP to a next hop working LSP.

14. The system of claim 11 wherein switching packets from said working LSP to said protection LSP includes switching the label of a packet from a working
30 label to a protection label.

15. The system of claim 11 wherein switching packets from said working LSP to said protection LSP includes adjusting TTL values of said packets to account for the number of LSRs that are along said protection LSP.

5 16. The system of claim 15 wherein adjusting said TTL values includes adding N to said TTL values, where N is a function of the number of LSRs along said protection LSP.

10 17. The system of claim 15 wherein said failure protection module includes logic for:

switching packets back to said working LSP from said protection LSP after said packets have traversed said protection LSP; and

15 using TTL values from packets that have traversed said protection LSP to generate TTL values for said packets that are switched back to said working LSP from said protection LSP.

18. The system of claim 15 wherein said failure protection module includes logic for:

20 switching packets from said protection LSP to a next hop working LSP after said packets have traversed said protection LSP; and

using TTL values from packets that have traversed said protection LSP to generate TTL values for said packets that are switched to said next hop working LSP from said protection LSP.

25 19. The system of claim 11 wherein said failure protection module includes logic for establishing unique protection LSPs for working LSPs that utilize the link between said LSR and said neighbor LSR.

20. A method for protecting a label switched path (LSP) between two label switch routers (LSRs) in a ring network that utilizes a label switching protocol to communicate packets of information, wherein each LSR in said ring network is connected to a right side neighbor LSR and a left side neighbor LSR by

5 respective links, said method comprising:

identifying a working LSP between first and second neighbor LSRs in said ring network, said working LSP having a first direction around said ring network;

establishing a protection LSP between said first and second neighbor LSRs for communicating packets between said first and second neighbor LSRs
10 in the event of a failure of the link that is utilized by said working LSP, said protection LSP utilizing LSRs on said ring network and having an opposite direction to said first direction;

switching packets from said working LSP to said protection LSP in response to a failure of said link that is utilized by said working LSP; and

15 adjusting TTL values of said switched packets by a value that is a function of the number of LSRs along said protection LSP.

21. The method of claim 20 wherein adjusting said TTL values includes adding N to said TTL values, where N is a function of the number of LSRs along
20 said protection LSP.

22. The method of claim 20 further including:

switching packets back to said working LSP from said protection LSP after said packets have traversed said protection LSP; and

25 using TTL values from packets that have traversed said protection LSP to generate TTL values for said packets that are switched back to said working LSP from said protection LSP.

23. The method of claim 20 further including:

switching packets from said protection LSP to a next hop working LSP
after said packets have traversed said protection LSP; and

using TTL values from packets that have traversed said protection LSP to
5 generate TTL values for said packets that are switched to said next hop working
LSP from said protection LSP.

24. The method of claim 20 further including establishing at least one
protection LSP for each link between neighbor LSRs on said ring network.

10 25. The method of claim 20 wherein said LSRs utilize multiprotocol label
switching (MPLS) to communicate packets around said ring network.